Event Related Potentials in High Intellectual Potential and High Functioning Autism pediatric patients

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Introduction

One of the most interesting challenge in psychophysiology is to distinguish children with High Intellectual Potential (HIP) from children with High Functioning Autism (HFA). Event Related Potentials (ERPs) is the measured brain response that is the direct result of a specific sensory or cognitive tasks. Mismatch negativity (MMN) and P300 event-related potential (ERP) reflect preattentive and attention-mediated sensory processing, respectively. Aim of this study was to evaluate the difference between two groups of children with HIP and HFA using Event Related Potentials.

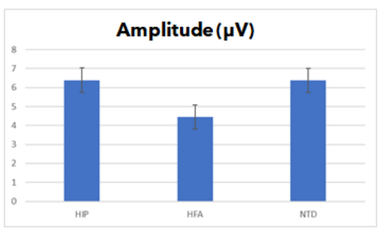
Methods

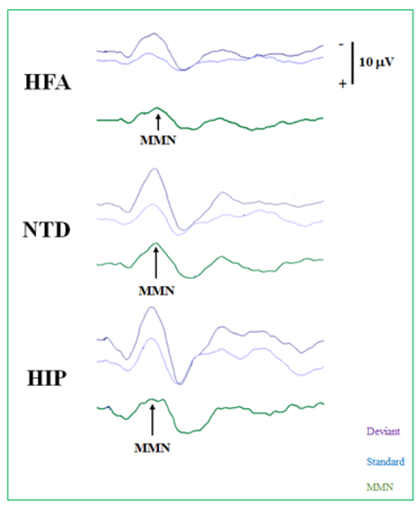
We enrolled 16 with HIP disorder (9.8±2.4) and 17 patients with HFA (12.83±2.5). The two groups were compared with control group (Normal Typical Development – NTD). They all underwent recording of mismatch negativity (MMN) and P300 potentials. All patients underwent cognitive and neuropsychological evaluations (WISC-IV, NEPSY, CPRS, SCQ, SRS, ADOS-2, ABAS-II).

Results

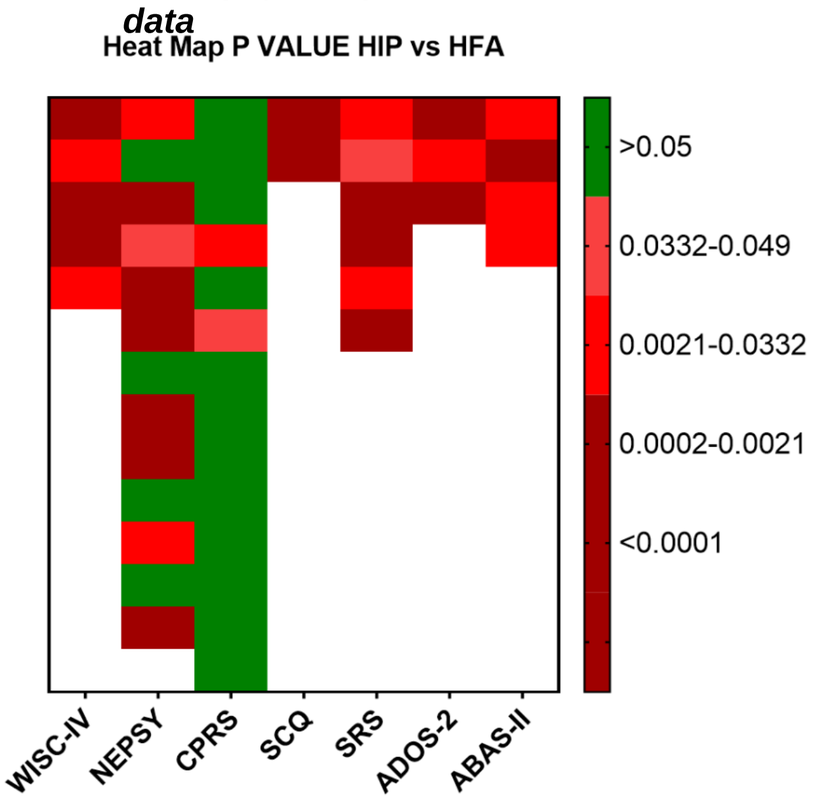
Neurophysiological data

	HIP		*HFA*		*NTD*		*ANOVA*		
MMN	*M*	*SD*	*M*	*SD*	*M*	*SD*	*HIP VS HFA*	*HFA VS NTD*	*HIP VS NTD*
Amplitude (μV)	6,380625	2,64233	4,448235	1,1298	6,375	1,8403	0,011107	0,00102869	0,99430264
Latency (ms)	94,615	28,61203	93,9652	20,0802	83,615	25,5042	0,93943986	0,19857752	0,24541258





Neuropsyhological data



Conclusion

HIP and HFA groups have neurophysiological and neuropsychologial differences but with some points of convergence. Cognitive tests were better in HIP compared to HFA children, while cognitive profile was similar in two groups. HIF showed better social skills, executive and adaptive functions compared to HFA. However HIF showed a worse social skills and adaptative functions compared to NTD subjects. MMN amplitude was lower in HFA compared to HIP and NTD groups. A slight but not statistically significat difference was found in MMN latency with HFA and HIP grater than NTD group. No differences in P300 was found.
However, HIF, while presenting a delay in MMN latency compared to NTD , probably due to the prefrontal brain maturation delay typical of HIF, and despite having a degree of social cognition similar to NTD, shows greater efficiency of brain networks that correlate significantly with the social functioning of the subjects, and therefore reflect social functioning, compared to the other populations examined.

Discussion

This is the first study in which Event Related Potentials showed psychophysiological difference between these two clinical pictures that can be difficult to distinguish clinically. It is possible that in children with HIF phenotype the pre-attentive processing of the sensory stimulus involves a larger amount of brain resources (neuronal clusters? extended networks?) than in HFA patients.